PORTABLE HIGH SPEED INTERNET ACCESS DEVICE

"This application is a continuation in part of application number 09/496,172 filed on 02/02/2000."

Prior Art

The background of the present invention includes US Patent # 5925103, Internet Access Device, which describes an improved Internet access system, vastly different from the present invention. Other prior art would include palm top computers and hand-held computers that have limited processing power due to design restrictions. Thus, these computers are much slower for accessing the Internet and World Wide Web.

Background of the invention

The present invention provides a remote Internet access device with rapid scrolling features of a web page on the device, which is an important aspect of the Internet experience. The result is an Internet access solution with rapid scrolling that occurs locally on the device. A PDA browser software program runs on the device, which has its own window and by scrolling inside this window, the host computer scrolls to the same location and sends only the portion of the image within the PDA browser window to the remote device, which is equal to or proportional to the size of the remote device's display screen.

Summary

It is an object of the present invention to disclose a portable device that can access the Internet and World Wide Web, at extremely low costs. It is another object of the present invention to provide fast access to parts of a web page received from the Internet, that are stored on the remote device for viewing at any time.

The present invention discloses a portable device that connects to a cellular telephone. Thus, the device has a wireless connection to the Internet. A host computer that runs a browser takes information received from the Internet and renders it onto a virtual display in its memory, but only the portion of the image of the web page is captured, reduced in color depth to a lower depth color image, then compressed and sent to the portable device of the invention, for displaying to the user. Hence, the portable device receives a compressed image, decompresses it, stores it into memory, and displays it for view. Thus, the user views a bit map image of a portion of the web page.

The portable device contains a PDA browser software which runs on the device containing its own window, and by scrolling inside this window, messages are sent to the host computer which scrolls to the same location. The CPU present in the portable device performs all scrolling functions locally on the device. Icons or buttons in the PDA browser window are mapped to similar icons or buttons in the host computer, such that by clicking on an icon or button in the PDA browser window sends a message to the host computer to click down on the same icon or button in the host computer. Clicking in an area of the PDA browser window sends a message to the host computer to provide a click down in the same location of the web page, whereby a new web page is loaded, and the portion of

the image that appears in the PDA browser window is reduced in color depth, compressed and sent to the portable device.

DETAILED DESCRIPTION OF THE DRAWINGS

The invention is described in more detail below with respect to an illustrative embodiment shown in the accompanying drawings in which:

Fig. 1 illustrates elements in the host computer, which communicates with a remote user and the portable device of the invention.

Fig. 2 illustrates the entire web page image compared with the displayable area sent to the remote device for view by a user.

Fig. 3 illustrates portions of the web page image that are sent to the remote device in accordance with the present invention.

Fig. 3a illustrates portions of the web page image that are stored in memory on the remote device in accordance with the present invention.

Fig. 4 illustrates the PDA browser software and PDA browser window.

Fig. 5 illustrates a tree of web pages viewed showing the sequence, which is stored in the host computer.

Fig. 6 illustrates the wireless connection between the remote device and a cellular phone.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

To facilitate description, any numeral identifying an element in one figure will represent the same element in any other figure.

The principal embodiment of the present invention aims to provide a portable device that allows a user to access the Internet or the World Wide Web (WWW), which is a device similar to a portable computer. It is another aim of the present invention, to provide a method to develop a cost competitive device. It is a further aim of the present invention to provide a means for rapidly scrolling around an image displayed on the portable device.

Currently, existing portable devices such as the Palm Pilot VII and Windows CE type devices contain an operating system, and within the operating system a mini-browser to interpret information received from the WWW or Internet and then display this information on the screen. This requires a powerful microprocessor. Such existing portable devices do not provide rapid scrolling within an opened application program, as each scroll command is sent to the host computer and a refreshed image is sent back to the portable device. This process is slow and tedious unlike the scrolling method performed directly on the portable device of the present invention.

The principal embodiment of the present invention is disclosed in **Figure 1**. A host computer **1** is depicted which is connected to the Internet, and that host computer receives information from outside in the form of HTML or JAVA or other formats, required to generate a web page. Running in the host computer, is a browser program **2** that receives all its information from outside and renders it onto a virtual display in its memory, hence a bitmap is made out of it. When a

remote user **3** requests to view a Web page (or electronic message, etc.) the host computer **1** receives HTML, JAVA, or other types of information from a web server outside the computer (as information may be gathered from a variety of different sources) and the browser program **2** takes all information received from outside and renders it onto a virtual display in its memory. What is therefore rendered in the memory is a web page, and a portion of this information is captured by the browser **2** and directed to another software **4**, which reduces the color depth of the information (i.e. the entire image comprising graphics and text) which is usually received in 24 bit color, subsequently reduced to a black and white bit map or raster image. Even though text may appear in black and white, the entire image may be 24 bit color which is reduced to black and white. This reduced portion of the web page is then compressed entirely using a loss-less method of compression by software **11**, implementing G3 or G4 methods in the preferred embodiment. This compressed image is sent through a port in the host computer **1**, in the preferred embodiment, to the cellular telephone **12** of **Fig. 1**, which is connected to the portable high speed internet access device **18** of the invention. The connection between the device and the cellular phone may be hard wired as provided by a data cable. However, in the preferred embodiment the connection between the device and the cellular phone may be wireless. With further reference to **Figure 6**, a module **29** is connected to the data connection port **30** on the cellular phone **12**. This module **29** contains a wireless transceiver **31** and related microelectronics, which uses its own protocol to transmit data to the device **18** and also receive data from the device. All error correction, encryption and protocol related issues are handled within the module **29** for sending and receiving data at the cellular phone. The device **18** also contains a similar transceiver **32** and related microelectronics, to enable wireless communication and data transfer between the device and cellular phone. The portable device **18**, which contains a display screen **20** with a transparent touch panel and related microelectronics, receives the compressed image,

decompresses the image, stores it into internal memory, and displays it for viewing to the user **3**.

In another embodiment, the cellular phone **12** of **Fig. 1** can be replaced by a wire less modem which is connected to the portable high speed internet access device **18** of the invention. This enables the portable device **18** to receive the compressed image, decompresses the image, store it into internal memory, and display it for viewing by the user **3**.

In another embodiment, the cellular phone **12** of **Fig. 1** can be replaced by a LAND line or PSTN which is connected to the portable high speed internet access device **18** of the invention. This enables the portable device **18** to receive the compressed image, decompresses the image, store it into internal memory, and display it for viewing by the user **3**.

In a further embodiment of the present invention, the image **5**, as shown in **Figure 2**, contains the information that would normally be displayed on a single Web page. As can be seen, the image **5** of the web page that is rendered by the browser **2** onto a virtual display in its memory is usually larger than the portion **6** of the web page sent to the device. Thus, only a portion of the image of the web page **5** is sent from the host computer **1** to the portable device **18 (Fig.1)**, to be displayed for view by a user. With further reference to **Figure 4**, an application program **21** is installed and runs on the portable device **18**. This application program **21** is referred to as the PDA browser software, which has its own PDA browser software window **22**. The PDA browser software window **22** is adjustable in size and may be set to be larger or smaller than the size of the display window **19** of the device, but ideally it is set to be the same size as the display window **19**. In particular, what the PDA browser software application program **21** facilitates is scrolling which is performed locally on the portable

device **18**, after a portion of the web page image **5** is sent to the portable device. The PDA browser software application program **21**, runs locally on the portable device **18** whose window **22** is also implemented locally on the portable device. The scrolling of the web page is done on the device facilitated by the browser scroll bars **24** or other methods of scrolling. Upon initiating a scrolling command on the remote device **18**, a message is sent from the remote device to the host computer **1** informing of the new location the PDA browser window **22** has scrolled to, so that the host computer may also scroll to that precise location, though there may be a lag or time difference between the scrolling on the remote device and scrolling on the host computer. Since the scroll commands are sent first to the host computer, any click commands initiated by the user **3** after scrolling would be sent after the scroll commands, subsequently entered on the host computer **1**. Icons or buttons in the PDA browser window **22** are mapped to similar icons or buttons providing web functions in the host computer **1**, such that by clicking on an icon or button in the PDA browser window sends a message to the host computer to click down on the same icon or button in the host computer. Hence the host computer **1** mirrors the PDA browser window **22**. The display window **19** contains a portion at the top, which has such buttons or icons providing web functions, and these are fixed with respect to the display window. Similarly, clicking in an area of the PDA browser window **22** sends a message to the host computer to provide a click down in the same location of the web page.

In the preferred embodiment of the invention and with further reference to **Figure 4**, the entire web page **5** which is much larger than the portable device's window **19**, is rendered onto a virtual display in memory by the browser **2** in the host computer **1**. A portion **6** of the image of the web page **5** is sent from the host computer **1** to the device **18**, which is equal to or proportional to the size of the browser window **22** in the device. This portion of the image is captured, the color depth reduced, and the image digitally compressed and sent to the portable

device **18**. The portable device receives this portion of the image, decompresses it, stores it into memory and displays it to the user. Hence, with further reference to **Figure 3**, the remote device **18** would first receive a portion **7** of the web page image **5** which is then decompressed and displayed on the display screen **20** after it is stored into a display memory, or as it is being stored into a display memory on the remote device. Thus the device shows the web page image from the display memory location. The entire web page **5** has memory allocated for it on the remote device and whenever the remote device gets different parts of the image, it digitally decompresses that part of the image and stores it in the correct location in the display memory on the device. The user also has the ability to scroll around on the device regardless of what portions of the web page image were received and stored in the display memory. If the user **3** only received segment **7** and the connection to the cellular telephone **12** was terminated, then the user may still scroll to other parts of the image, but only portions of segment **7** will appear in the display screen **20** if these portions are in the area where the browser window **22** has scrolled to. No other areas would be displayed since only segment **7** was received, and other areas would appear white and can only be displayed if the connection to the cellular phone is resumed, for the host computer to send portions of the web page where the browser window **22** has scrolled to. When the cellular phone connection is active, and the user **3** scrolls to another part of the image of the web page which may involve horizontal and or vertical scrolling, the exact scrolling commands are transmitted from the remote device **18** to the host computer **1**, so that the host computer knows exactly where the user has scrolled to and the part of the web page **5** that would appear in the browser window **22** of the device **18** is captured, the color depth reduced, and the image compressed and sent to the portable device **18**. The portable device receives this portion of the image, decompresses it, stores it in the correct location in the display memory and displays it for view to the user as web page segment **8 (Figure 3)**. Portions **10** that are common to both web page segments

7 and 8 are not sent again with segment 8, as this is already there in the display memory on the portable device 18. Thus, portion 10 is immediately displayed first on the screen then the remainder of segment 8 is sent by the host computer, and displayed shortly afterwards on the screen of the device. Sending only the portion of the image that appears in the browser window 22 to the remote device also reduces the bandwidth considerably, and conserves on memory in the portable device, compared to sending the entire web page to be stored on the device. The user 3 may scroll again to other areas of the web page 5 and only the portion of the web page that would appear in the browser window 22 of the device 18 is captured, the color depth reduced, and the image compressed and sent to the portable device 18, which stores it in the correct location in the display memory and displays it to the user as web page segment 9. Hence, only the areas scrolled to are sent to the remote device 18, since the user at the remote device only gets the data of where scrolled to, and these areas would be stored in the exact location in the display memory on the device as they appear on the web page in the host computer. Thus, segments 7, 8 & 9 are put in their correct location in the display memory as they appear on the web page 5 such that when the user scrolls around, parts of the image containing segments 7, 8 & 9 are visible in their correct location, even if the connection to the cellular phone is terminated. In this particular example, the display memory on the portable device 18 for web page 5 would be expanded to contain segments 7, 8, and 9 since these are the only areas scrolled to by the user, and these segments comprise the entire web page image that would be stored into memory on the device 18 for the web page 5 received by the host computer 1. Hence, area 28 of **Figure 3a** represents the portion of web page 5 that is actually stored in memory on the device for this particular web page, as these are the only areas scrolled to. The host computer also keeps a record of which segments were sent to the device 18 in its memory for each web page viewed, in the event the user 3 returns to a previously viewed web page, the host computer would know exactly

which segments were sent and stored in memory on the device **18**, and these segments would not be sent again. This means that the device also compresses and stores into memory previously viewed web pages and any information on links to all viewed web pages on the device. Thus, if the user is viewing a particular web page on the device and clicks on a link to go to another web page, that particular web page is compressed and stored into memory with link information to the previously viewed web page, in case the user wants to return to it. Therefore, the device moves the current web page from the display memory and clears this display memory, compresses and stores this web page in a different memory location with link information, and allows portions of the new web page to be stored in the display memory for view by the user. A tree is created of links between all web pages viewed on the remote device as further illustrated in **Figure 5**. This tree illustrates the sequence of web pages viewed with web pages represented by numerals **5, 16, 17, 23** and **25**, and this information is stored in the device **18**, so that the user **3** may view previously seen web pages by clicking on the back icon **26** and forward icon **27**, **(Figure 4)**. Thus, if the user **3** is viewing web page **23** and clicks on the back icon **26**, web page **17** will be retrieved from memory, digitally expanded or decompressed and placed in the display memory to be viewed on the device **18** by the user, and the user will be able to scroll around this image. The previously viewed web page **23** would be removed from the display memory, compressed, and stored in another memory location on the device prior to retrieving and displaying web page **17**. The device would store numerous saved web pages viewed and the tree of links between all web pages viewed on the remote device in its memory. If the user is viewing a particular web page **16** and returns to a previously viewed web page **5 (Fig.5)** by clicking on the back icon **26 (Fig. 4)**, the last area the user was viewing on web page **5** is the first area that shows up on the display screen **20**. Hence, when a web page is saved in memory on the device **18** the last scrolled or viewed location is also saved in that memory. User preferences are also

stored on the host computer. In particular, the web pages that the user frequently visits (favorite web pages) and the locations on those particular web pages that the user frequently visits (favorite locations), are all stored on the host computer automatically, based on the user's prior usage pattern. Thus, when the user types in the address of a favorite web page on the remote device, for example web page **5** of **Figure 3**, a message is sent to the host computer informing of the web page address, and the host computer automatically recognizes that the user has frequently visited this web page previously and does not only send portion **7** of the web page. Portions **8, 9** and **13** are also sent to the remote device based on previous usage patterns as these are areas frequently scrolled to for this particular web page, and all these portions are sent in anticipation of the user scrolling to such favorite locations. This information is stored on the host computer for each such favorite web page.

If the user scrolls to segment **13 (Fig.3)** after first scrolling to segments **7, 8** & **9**, areas **14** and **15** common to segments **8, 9** and **13** are immediately displayed first on the screen **20** as they exist in the display memory on the device **18**, then the remainder of segment **13** (not including areas **14** and **15**) is sent by the host computer, stored in the display memory in its correct location, and displayed shortly afterwards on the screen **20** of the device. Thus, the display memory on the portable device **18** for web page **5** would be expanded to contain only segments **7, 8, 9** and **13** as a page, with no information stored on other parts of the web page that are not scrolled to. Each web page viewed is stored on the device **18** and also the host computer **1**, and a tree is created of links between all web pages viewed as further illustrated in **Figure 5**. This tree illustrates the sequence of web pages viewed with web pages represented by numerals **5, 16, 17, 23** and **25**, and this information containing links to all web pages is also stored in the host computer **1**, so that the user **3** may view previously seen web pages by clicking on the back icon **26** and forward icon **27**, **(Figure 4)**. Thus, if

the user **3** is viewing web page **23** and clicks on the back icon **26**, web page **17** will be displayed on the device **18**. Clicking on the forward icon **27** displays web page **23** again to the user.

In another embodiment of the present invention, the entire web page which is much larger than the portable device's window, is rendered onto a virtual display in memory by the browser **2** in the host computer **1**, the color depth reduced for the entire image, but only the portion of the image of the web page **5** that would appear in the browser window **22** of the device **18** is captured, and the image digitally compressed for this portion and sent to the portable device **18**.

In a further embodiment of the present invention, the entire web page which is much larger than the portable device's window, is rendered onto a virtual display in memory by the browser **2** in the host computer **1**, the color depth reduced and the entire image digitally compressed, but only the portion of the image of the web page **5** that would appear in the browser window **22** of the device **18** is captured after the entire image is digitally compressed, and sent to the portable device **18**.

In another embodiment of the present invention, the portion of the image of any web page that is captured and sent to the remote device is slightly larger than the browser window **22** of the device **18**, instead of being the same size as the browser window **22**, for all previous embodiments. Hence, the user may scroll around a little without a new area being sent from the host computer allowing the user to scroll slightly outside the display area. However, once the user scrolls outside the area that was captured, sent to the remote device and is presently displayed, the new area scrolled to is sent to the device which is again slightly larger than the browser window **22**.